



SEQUENCE LISTING

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TECH CENTER 1600/2900

<110> Lipton, Stuart A.  
Okamoto, Shu-ichi

<120> Methods of Differentiating and  
Protecting Cells By Modulating the P38/MEF2 Pathway

<130> P-LJ 4714

<140> US 09/876,187

<141> 2001-06-05

<150> US 60/209,539

<151> 2000-06-05

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cgctctccac catgcctggc tgatatttat atttttagta gagatggagt ttcaccatgt 240  
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taacttttga attaaatatt tggaatataa ggaaataagg aaagttgact gaaa atg 417

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Gly Arg Lys Lys Ile Gln Ile Thr Arg Ile Met Asp Glu Arg Asn Arg  
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Gln Val Thr Phe Thr Lys Arg Lys Phe Gly Leu Met Lys Lys Ala Tyr  
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35 40 45

agc tct aac aaa ctg ttt caa tat gct agc act gat atg gac aaa gtt	609
Ser Ser Asn Lys Leu Phe Gln Tyr Ala Ser Thr Asp Met Asp Lys Val	
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Leu Leu Lys Tyr Thr Glu Tyr Asn Glu Pro His Glu Ser Arg Thr Asn	
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tcg gat att gtt gag gct ctg aac aag aag gaa cac aga ggg tgc gac	705
Ser Asp Ile Val Glu Ala Leu Asn Lys Lys Glu His Arg Gly Cys Asp	
85 90 95	
agc cca gac cct gat act tca tat gtg cta act cca cat aca gaa gaa	753
Ser Pro Asp Pro Asp Thr Ser Tyr Val Leu Thr Pro His Thr Glu Glu	
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aaa tat aaa aaa att aat gag gaa ttt gat aat atg atg cgg aat cat	801
Lys Tyr Lys Lys Ile Asn Glu Glu Phe Asp Asn Met Met Arg Asn His	
115 120 125	
aaa atc gca cct ggt ctg cca cct cag aac ttt tca atg tct gtc aca	849
Lys Ile Ala Pro Gly Leu Pro Pro Gln Asn Phe Ser Met Ser Val Thr	
130 135 140 145	
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Val Pro Val Thr Ser Pro Asn Ala Leu Ser Tyr Thr Asn Pro Gly Ser	
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Ser Leu Val Ser Pro Ser Leu Ala Ala Ser Ser Thr Leu Thr Asp Ser	
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Ser Met Leu Ser Pro Pro Gln Thr Thr Leu His Arg Asn Val Ser Pro	
180 185 190	
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Gly Ala Pro Gln Arg Pro Pro Ser Thr Gly Asn Ala Gly Gly Met Leu	
195 200 205	
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Ser Thr Thr Asp Leu Thr Val Pro Asn Gly Ala Gly Ser Ser Pro Val	
210 215 220 225	
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Gly Asn Gly Phe Val Asn Ser Arg Ala Ser Pro Asn Leu Ile Gly Ala	
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act ggt gca aat agc tta ggc aaa gtc atg cct aca aag tct ccc cct	1185
Thr Gly Ala Asn Ser Leu Gly Lys Val Met Pro Thr Lys Ser Pro Pro	
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Pro Pro Gly Gly Gly Asn Leu Gly Met Asn Ser Arg Lys Pro Asp Leu	
260 265 270	
cga gtt gtc atc ccc cct tca agc aag ggc atg atg cct cca cta tcg	1281
Arg Val Val Ile Pro Pro Ser Ser Lys Gly Met Met Pro Pro Leu Ser	
275 280 285	
gag gaa gag gaa ttg gag ttg aac acc caa agg atc agt agt tct caa	1329
Glu Glu Glu Glu Leu Glu Leu Asn Thr Gln Arg Ile Ser Ser Ser Gln	
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gcc act caa cct ctt gct acc cca gtc gtg tct gtg aca acc cca agc	1377
Ala Thr Gln Pro Leu Ala Thr Pro Val Val Ser Val Thr Thr Pro Ser	
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Leu Pro Pro Gln Gly Leu Val Tyr Ser Ala Met Pro Thr Ala Tyr Asn	
325 330 335	
act gat tat tca ctg acc agc gct gac ctg tca gcc ctt caa ggc ttc	1473
Thr Asp Tyr Ser Leu Thr Ser Ala Asp Leu Ser Ala Leu Gln Gly Phe	
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aac tcg cca gga atg ctg tcg ctg gga cag gtg tcg gcc tgg cag cag	1521
Asn Ser Pro Gly Met Leu Ser Leu Gly Gln Val Ser Ala Trp Gln Gln	
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His His Leu Gly Gln Ala Ala Leu Ser Ser Leu Val Ala Gly Gly Gln	
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tta tct cag ggt tcc aat tta tcc att aat acc aac caa aac atc agc	1617
Leu Ser Gln Gly Ser Asn Leu Ser Ile Asn Thr Asn Gln Asn Ile Ser	
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atc aag tcc gaa ccg att tca cct cct cgg gat cgt atg acc cca tcg	1665
Ile Lys Ser Glu Pro Ile Ser Pro Pro Arg Asp Arg Met Thr Pro Ser	
405 410 415	
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Val Leu Gly Arg Pro Pro Asn Thr Glu Asp Arg Glu Ser Pro Ser Val  
485 490 495

aag cga atg agg atg gac gcg tgg gtg acc taaggcttcc aagctgatgt 1955  
Lys Arg Met Arg Met Asp Ala Trp Val Thr  
500 505

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tgagttaa atatttatat gtacatacat atatatatcc ctttacctat atatgtatgt 2075  
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Tyr Glu Leu Ser Val Leu Cys Asp Cys Glu Ile Ala Leu Ile Ile Phe  
35 40 45  
Asn Ser Ser Asn Lys Leu Phe Gln Tyr Ala Ser Thr Asp Met Asp Lys  
50 55 60  
Val Leu Leu Lys Tyr Thr Glu Tyr Asn Glu Pro His Glu Ser Arg Thr  
65 70 75 80  
Asn Ser Asp Ile Val Glu Ala Leu Asn Lys Lys Glu His Arg Gly Cys  
85 90 95  
Asp Ser Pro Asp Pro Asp Thr Ser Tyr Val Leu Thr Pro His Thr Glu  
100 105 110  
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agcatgtgcg tcgctccctc cccgagctgg ccagcacaa ggcagacatg cagcgttggg 180
aggagcagag ccagggagcc atctacactg tggagtacgc ctgcagcgcg gtgaagaacc 240
tgggtggacag cagcgtctac ttccgcagcg tggagggtct gctcaaacag gccatcagca 300
tccgggacca tatgaatgcc agtgcccagg gccacagccc ggaggaacca ccccccgcct 360
cctcagcctg atcctggaag agactcgggg ccccccagcc tccgccaacc cagacaaaga 420
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Met Gly Arg Lys Lys Ile Gln Ile Ser Arg  
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Ile Leu Asp Gln Arg Asn Arg Gln Val Thr Phe Thr Lys Arg Lys Phe
15 20 25

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Gly Leu Met Lys Lys Ala Tyr Glu Leu Ser Val Leu Cys Asp Cys Glu
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ata gcc ctc atc atc ttc aac agc gcc aac cgc ctc ttc cag tat gcc 616
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45 50 55

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agc acg gac atg gac cgt gtg ctg ctg aag tac aca gag tac agc gag 664
Ser Thr Asp Met Asp Arg Val Leu Leu Lys Tyr Thr Glu Tyr Ser Glu
60 65 70

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Pro His Glu Ser Arg Thr Asn Thr Asp Ile Leu Glu Thr Leu Lys Arg
75 80 85 90

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agg ggc att ggc ctc gat ggg cca gag ctg gag ccg gat gaa ggg cct 760
Arg Gly Ile Gly Leu Asp Gly Pro Glu Leu Glu Pro Asp Glu Gly Pro
95 100 105

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gag gag cca gga gag aag ttt cgg agg ctg gca ggc gaa ggg ggt gat 808
Glu Glu Pro Gly Glu Lys Phe Arg Arg Leu Ala Gly Glu Gly Gly Asp
110 115 120

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ccg gcc ttg ccc cga ccc cgg ctg tat cct gca gct cct gct atg ccc 856
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125 130 135

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cga cca gca gcc ccc aaa gcc ggg ccc cca ggc ctg gtg cac cct ctc	1000
Arg Pro Ala Ala Pro Lys Ala Gly Pro Pro Gly Leu Val His Pro Leu	
175 180 185	
ttc tca cca agc cac ctc acc agc aag aca cca ccc cca ctg tac ctg	1048
Phe Ser Pro Ser His Leu Thr Ser Lys Thr Pro Pro Pro Leu Tyr Leu	
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Pro Thr Glu Gly Arg Arg Ser Asp Leu Pro Gly Gly Leu Ala Gly Pro	
205 210 215	
cga ggg gga cta aac acc tcc aga agc ctc tac agt ggc ctg cag aac	1144
Arg Gly Gly Leu Asn Thr Ser Arg Ser Leu Tyr Ser Gly Leu Gln Asn	
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ccc tgc tcc act gca act ccc gga ccc cca ctg ggg agc ttc ccc ttc	1192
Pro Cys Ser Thr Ala Thr Pro Gly Pro Pro Leu Gly Ser Phe Pro Phe	
235 240 245 250	
ctc ccc gga ggc ccc cca gtg ggg gcc gaa gcc tgg gcg agg agg gtc	1240
Leu Pro Gly Gly Pro Pro Val Gly Ala Glu Ala Trp Ala Arg Arg Val	
255 260 265	
ccc caa ccc gcg gcg cct ccc cgc cga ccc ccc cag tca gca tca agt	1288
Pro Gln Pro Ala Ala Pro Pro Arg Arg Pro Pro Gln Ser Ala Ser Ser	
270 275 280	
ctg agc gcc tct ctc cgg ccc ccg ggg gcc ccg gcg act ttc cta aga	1336
Leu Ser Ala Ser Leu Arg Pro Pro Gly Ala Pro Ala Thr Phe Leu Arg	
285 290 295	
cct tcc cct atc cct tgc tcc tcg ccc ggt ccc tgg cag agc ctc tgc	1384
Pro Ser Pro Ile Pro Cys Ser Ser Pro Gly Pro Trp Gln Ser Leu Cys	
300 305 310	
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Gly Leu Gly Pro Pro Cys Ala Gly Cys Pro Trp Pro Thr Ala Gly Pro	
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335 340 345	
gcg agg gca cgt ggg gac ccc acc tcc ctc cag gcc tct tca gag aag	1528
Ala Arg Ala Arg Gly Asp Pro Thr Ser Leu Gln Ala Ser Ser Glu Lys	
350 355 360	
acc caa cag tgacgcccc ctccgcggtg ggggcttggg ggtgggcggc	1577

Thr Gln Gln  
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Tyr Glu Leu Ser Val Leu Cys Asp Cys Glu Ile Ala Leu Ile Ile Phe  
35 40 45  
Asn Ser Ala Asn Arg Leu Phe Gln Tyr Ala Ser Thr Asp Met Asp Arg  
50 55 60  
Val Leu Leu Lys Tyr Thr Glu Tyr Ser Glu Pro His Glu Ser Arg Thr  
65 70 75 80  
Asn Thr Asp Ile Leu Glu Thr Leu Lys Arg Arg Gly Ile Gly Leu Asp  
85 90 95  
Gly Pro Glu Leu Glu Pro Asp Glu Gly Pro Glu Glu Pro Gly Glu Lys  
100 105 110  
Phe Arg Arg Leu Ala Gly Glu Gly Gly Asp Pro Ala Leu Pro Arg Pro  
115 120 125  
Arg Leu Tyr Pro Ala Ala Pro Ala Met Pro Ser Pro Asp Val Val Tyr  
130 135 140  
Gly Ala Leu Pro Pro Pro Gly Cys Asp Pro Ser Gly Leu Gly Glu Ala  
145 150 155 160  
Leu Pro Ala Gln Ser Arg Pro Ser Pro Phe Arg Pro Ala Ala Pro Lys  
165 170 175  
Ala Gly Pro Pro Gly Leu Val His Pro Leu Phe Ser Pro Ser His Leu  
180 185 190  
Thr Ser Lys Thr Pro Pro Pro Leu Tyr Leu Pro Thr Glu Gly Arg Arg  
195 200 205  
Ser Asp Leu Pro Gly Gly Leu Ala Gly Pro Arg Gly Gly Leu Asn Thr  
210 215 220  
Ser Arg Ser Leu Tyr Ser Gly Leu Gln Asn Pro Cys Ser Thr Ala Thr  
225 230 235 240  
Pro Gly Pro Pro Leu Gly Ser Phe Pro Phe Leu Pro Gly Gly Pro Pro  
245 250 255  
Val Gly Ala Glu Ala Trp Ala Arg Arg Val Pro Gln Pro Ala Ala Pro  
260 265 270  
Pro Arg Arg Pro Pro Gln Ser Ala Ser Ser Leu Ser Ala Ser Leu Arg  
275 280 285  
Pro Pro Gly Ala Pro Ala Thr Phe Leu Arg Pro Ser Pro Ile Pro Cys  
290 295 300  
Ser Ser Pro Gly Pro Trp Gln Ser Leu Cys Gly Leu Gly Pro Pro Cys  
305 310 315 320  
Ala Gly Cys Pro Trp Pro Thr Ala Gly Pro Gly Arg Arg Ser Pro Gly



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Gly	Thr	Ser	Pro	Glu	Arg	Ser	Pro	Gly	Thr	Ala	Arg	Ala	Arg	Gly	Asp				
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 gctgaagaag gagatttggt tggaggaaac aggaaagaga aagaaaagga aggaaaaaat 360  
 acataatttc agggacgaga gagagaagaa aaacggggac t atg ggg aga aaa aag 416  
 Met Gly Arg Lys Lys  
 1 5

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 Ile Gln Ile Thr Arg Ile Met Asp Glu Arg Asn Arg Gln Val Thr Phe  
 10 15 20

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 Thr Lys Arg Lys Phe Gly Leu Met Lys Lys Ala Tyr Glu Leu Ser Val  
 25 30 35

ctg tgt gac tgt gag att gcg ctg atc atc ttc aac agc acc aac aag 560  
 Leu Cys Asp Cys Glu Ile Ala Leu Ile Ile Phe Asn Ser Thr Asn Lys  
 40 45 50

ctg ttc cag tat gcc agc acc gac atg gac aaa gtg ctt ctc aag tac 608  
 Leu Phe Gln Tyr Ala Ser Thr Asp Met Asp Lys Val Leu Leu Lys Tyr  
 55 60 65

acg gag tac aac gag ccg cat gag agc cgg aca aac tca gac atc gtg 656  
 Thr Glu Tyr Asn Glu Pro His Glu Ser Arg Thr Asn Ser Asp Ile Val  
 70 75 80 85

gag acg ttg aga aag aag ggc ctt aat ggc tgt gac agc cca gac ccc 704  
 Glu Thr Leu Arg Lys Lys Gly Leu Asn Gly Cys Asp Ser Pro Asp Pro  
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gat gcg gac gat tcc gta ggt cac agc cct gag tct gag gac aag tac 752  
 Asp Ala Asp Asp Ser Val Gly His Ser Pro Glu Ser Glu Asp Lys Tyr

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Arg Lys Ile Asn Glu Asp Ile Asp Leu Met Ile Ser Arg Gln Arg Leu			
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Cys Ala Val Pro Pro Pro Asn Phe Glu Met Pro Val Ser Ile Pro Val			
135	140	145	
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Ser Ser His Asn Ser Leu Val Tyr Ser Asn Pro Val Ser Ser Leu Gly			
150	155	160	165
aac ccc aac cta ttg cca ctg gct cac cct tct ctg cag agg aat agt			944
Asn Pro Asn Leu Leu Pro Leu Ala His Pro Ser Leu Gln Arg Asn Ser			
170	175	180	
atg tct cct ggt gta aca cat cga cct cca agt gca ggt aac aca ggt			992
Met Ser Pro Gly Val Thr His Arg Pro Pro Ser Ala Gly Asn Thr Gly			
185	190	195	
ggt ctg atg ggt gga gac ctc acg tct ggt gca ggc acc agt gca ggg			1040
Gly Leu Met Gly Gly Asp Leu Thr Ser Gly Ala Gly Thr Ser Ala Gly			
200	205	210	
aac ggg tat ggc aat ccc cga aac tca cca ggt ctg ctg gtc tca cct			1088
Asn Gly Tyr Gly Asn Pro Arg Asn Ser Pro Gly Leu Leu Val Ser Pro			
215	220	225	
ggt aac ttg aac aag aat atg caa gca aaa tct cct ccc cca atg aat			1136
Gly Asn Leu Asn Lys Asn Met Gln Ala Lys Ser Pro Pro Pro Met Asn			
230	235	240	245
tta gga atg aat aac cgt aaa cca gat ctc cga gtt ctt att cca cca			1184
Leu Gly Met Asn Asn Arg Lys Pro Asp Leu Arg Val Leu Ile Pro Pro			
250	255	260	
ggc agc aag aat acg atg cca tca gtg tct gag gat gtc gac ctg ctt			1232
Gly Ser Lys Asn Thr Met Pro Ser Val Ser Glu Asp Val Asp Leu Leu			
265	270	275	
ttg aat caa agg ata aat aac tcc cag tcg gct cag tca ttg gct acc			1280
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Pro Val Val Ser Val Ala Thr Pro Thr Leu Pro Gly Gln Gly Met Gly			
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Gly Tyr Pro Ser Ala Ile Ser Thr Thr Tyr Gly Thr Glu Tyr Ser Leu			
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Ser Ser Ala Asp Leu Ser Ser Leu Ser Gly Phe Asn Thr Ala Ser Ala  
330 335 340

ctt cac ctt ggt tca gta act ggc tgg caa cag caa cac cta cat aac 1472  
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345 350 355

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360 365 370

tta tct cag agt tca aat ctc tcc ctg cct tct act caa agc ctc aac 1568  
Leu Ser Gln Ser Ser Asn Leu Ser Leu Pro Ser Thr Gln Ser Leu Asn  
375 380 385

atc aag tca gaa cct gtt tct cct cct aga gac cgt acc acc acc cct 1616  
Ile Lys Ser Glu Pro Val Ser Pro Pro Arg Asp Arg Thr Thr Thr Pro  
390 395 400 405

tcg aga tac cca caa cac acg cgc cac gag gcg ggg aga tct cct gtt 1664  
Ser Arg Tyr Pro Gln His Thr Arg His Glu Ala Gly Arg Ser Pro Val  
410 415 420

gac agc ttg agc agc tgt agc agt tcg tac gac ggg agc gac cga gag 1712  
Asp Ser Leu Ser Ser Cys Ser Ser Ser Tyr Asp Gly Ser Asp Arg Glu  
425 430 435

gat cac cgg aac gaa ttc cac tcc ccc att gga ctc acc aga cct tcg 1760  
Asp His Arg Asn Glu Phe His Ser Pro Ile Gly Leu Thr Arg Pro Ser  
440 445 450

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Gly Trp Ala Thr  
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<212> PRT

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Tyr Glu Leu Ser Val Leu Cys Asp Cys Glu Ile Ala Leu Ile Ile Phe
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Asn Ser Thr Asn Lys Leu Phe Gln Tyr Ala Ser Thr Asp Met Asp Lys
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Val Leu Leu Lys Tyr Thr Glu Tyr Asn Glu Pro His Glu Ser Arg Thr
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Asn Ser Asp Ile Val Glu Thr Leu Arg Lys Lys Gly Leu Asn Gly Cys
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Asp Ser Pro Asp Pro Asp Ala Asp Asp Ser Val Gly His Ser Pro Glu
100         105         110
Ser Glu Asp Lys Tyr Arg Lys Ile Asn Glu Asp Ile Asp Leu Met Ile
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Ser Arg Gln Arg Leu Cys Ala Val Pro Pro Pro Asn Phe Glu Met Pro
130         135         140
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Met Gly Arg Lys Lys  
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 Glu Thr Leu Arg Lys Lys Gly Leu Asn Gly Cys Asp Ser Pro Asp Pro  
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Asn	Gly	Tyr	Gly	Asn	Pro	Arg	Asn	Ser	Pro	Gly	Leu	Leu	Val	Ser	Pro	
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 Ser Glu Asp Lys Tyr Arg Lys Ile Asn Glu Asp Ile Asp Leu Met Ile  
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	435					440					445				
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